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IS 8364 (1989): Free cutting brass wire [MTD 8: Copper and Copper Alloys]

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*Indian Standard*

**FREE CUTTING BRASS WIRE—  
SPECIFICATION**

*(First Revision)*

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**BUREAU OF INDIAN STANDARDS**  
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## **Copper and Copper Alloys Sectional Committee, MTD 8**

### **FOREWORD**

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards on 16 January 1989, after the draft finalized by the Copper and Copper Alloys Sectional Committee had been approved by the Structural and Metals Division Council.

This standard has been prepared for material used for making screw, terminals, pins, spoke nipples for screw-cutting and turning work and for this purpose, three types of free-cutting brass wire have been specified.

This standard was first published in 1977. In this revision, following modifications have been made:

- a) The clause on references has been added;
- b) The clauses on chemical composition and analysis, mercurous nitrate test, diameter and tolerances and packing and marking have been modified;
- c) The requirement of sampling and criteria for conformity and retest have been modified; and
- d) The requirement of test certificate have been added.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

# Indian Standard

## FREE CUTTING BRASS WIRE— SPECIFICATION

*(First Revision)*

### **1 SCOPE**

This standard covers the requirements for leaded brass wire for making screws, terminals, pins, spoke nipples, etc, suitable for screw-cutting and turning work.

### **2 REFERENCES**

The Indian Standards listed below are necessary adjuncts to this standard:

<i>IS No.</i>	<i>Title</i>
IS 1387 : 1967	General requirements for the supply of metallurgical materials ( <i>first revision</i> )
IS 2305 : 1988	Method for mercurous nitrate test for copper and copper alloys ( <i>first revision</i> )
IS 2656 : 1964	Method for tensile testing of copper and copper alloy wire ( <i>first revision</i> )
IS 3288 (Part 3) : 1966	Glossary of terms relating to copper and copper alloys: Part 3 Wrought form
IS 3685 : 1966	Methods of chemical analysis of brass
IS 9861 : 1981	Dimensions for wrought copper and copper alloy wires for general engineering purposes

### **3 TERMINOLOGY**

For the purpose of this standard, the following definition as given in IS 3288 (Part 3) : 1986 shall apply.

#### **3.1 Wire**

A solid section of uniform cross-section along its whole length and the distance between two parallel faces not exceeding 6 mm, may be supplied in straight length or in coils or in spools.

### **4 SUPPLY OF MATERIAL**

General requirements to the supply of material shall be as laid down in IS 1387 : 1967.

### **5 FREEDOM FROM DEFECTS**

The material shall be clean, smooth, free from surface defects, reasonably straight and free from twist and blanks. There shall be no joints in the wire except those made in the rod or wire before final drawing.

### **6 CONDITION OF SUPPLY**

The wire shall be supplied in one of the following conditions as specified by the purchaser:

- a) Annealed (O),
- b) Half-hard (HB), and
- c) Hard (HD).

### **7 CHEMICAL COMPOSITION**

**7.1** The material shall conform to the chemical composition as specified in Table 1.

**7.2** The chemical composition shall be determined either by the methods specified in IS 3685 : 1966 or any other established instrumental/chemical method. In case of dispute, the procedure specified in IS 3685 : 1966 shall be the referee method.

### **8 MECHANICAL PROPERTIES**

#### **8.1 Tensile Test**

The material, when tested in accordance with IS 2656 : 1964 shall have the tensile and elongation properties as given in Table 2.

**8.1.1** Should a tensile test piece break outside the middle third of its gauge length and the elongation percentage obtained be lower than the minimum specified, the test may be discarded and another test made.

#### **8.2 Bend Test**

The wire shall be bent cold through the following angles around the mandrel equal to twice the diameter of the wire. The wire shall not break with subjected to the test:

<i>Condition</i>	<i>Grade 1</i>	<i>Grades 2 and 3</i>
Annealed (O)	90° R	120° R
Half-hard (HB)	45° R	60° R
Hard (HD)	—	—

**Table 1 Chemical Composition of Free-Cutting Brass Wire**  
*(Clause 7.1)*

<b>Constituent</b>	<b>Percent</b>		
	<b>Grade 1</b>	<b>Grade 2</b>	<b>Grade 3</b>
(1)	(2)	(3)	(4)
Copper	<b>56·0-59·0</b>	<b>60·0-63·0</b>	<b>60·0-63·0</b>
Lead	<b>2·0-3·5</b>	<b>2·5-3·7</b>	<b>0·5-1·5</b>
Iron	<b>0·35, Max</b>	<b>0·35, Max</b>	<b>0·2, Max</b>
Total other impurities (excluding iron)	<b>0·7, Max</b>	<b>0·5, Max</b>	<b>0·5, Max</b>
Zinc	Remainder	Remainder	Remainder

**NOTES**

- If required, antimony may be restricted to 0·02 percent in Grade 1.
- Any nickel or silver present is to be counted as copper.
- Other impurities do not preclude the possible presence of other unnamed elements. However, analysis shall regularly be made only for the minor elements listed in the table, plus either copper or zinc. The major element that is not analyzed shall be determined by difference between the sum of those elements analyzed and 100 percent. By agreement between the manufacturer and the purchaser, analysis may be required and limits established for elements not specified.

**Table 2 Tensile Properties of Free-Cutting Brass Wire**  
*(Clause 8.1)*

<b>Grade</b>	<b>Condition</b>	<b>Tensile Strength</b> MPa, Min	<b>Elongation Percent</b> on Gauge Length of 100 mm, Min
1	O	355	10
	HB	410	4
	HD	590	—
2	O	345	12
	HB	400	6
	HD	590	—
3	O	325	20
	HB	400	8
	HD	500	—

NOTE — 1N/mm<sup>2</sup> = 0·102 kgf/mm<sup>2</sup> = 1 MPa.

## 9 MERCUROUS NITRATE TEST

**9.1** If required by the purchaser, the material shall be subjected to test as specified in IS 2305 : 1988.

**9.2** There shall be no crack in the specimen when examined immediately after the test specimen is removed from the solution, rinsed with water and wiped off.

## 10 DIAMETER AND TOLERANCES

**10.1** The diameter of the wire shall be required by the purchaser and stated in the order.

**10.2** The tolerances on the diameter shall be in accordance with IS 9861 : 1981.

**10.3** Where tolerances other than those specified in **10.2** are required, these shall be subject to agreement between the purchaser and the supplier.

## 10.4 Measurement

The diameter of round wire shall be determined by means of a suitable micrometer and by taking the mean of the measurement at right angles made at the same cross-section of the sample.

## **11 SAMPLING AND CRITERIA FOR CONFORMITY**

Unless otherwise agreed to between the purchaser and the supplier, the following sampling procedure and criteria for conformity shall hold good.

### **11.1 Lot**

In any consignment, all the coils/bundles of wire of same size, grade and temper, manufactured from the same raw material, produced at the same place, shall be grouped together to constitute a lot. However, a lot shall not exceed 1 000 kg in mass. If necessary, two or more lots shall be formed on the basis of the mass of the consignment.

**11.2** Each coil/bundle shall be examined for freedom from defects and for tolerance on diameter. Any coil/bundle found defective shall be rejected.

**11.3** From the coil/bundles found satisfactory in **11.2**, one sample per 1 000 kg or part thereof in the lot shall be selected and tested for chemical composition, mechanical properties (tensile test and bend test) and mercurous nitrate test. For this purpose, the coils from which the samples are cut, shall be selected at random.

**11.3.1** If the test results of chemical analysis as obtained for each of the constituent satisfy the corresponding requirements, the lot shall be considered as conforming to the chemical composition requirements of this specification.

**11.3.2** If the test results satisfy the corresponding requirements of the mechanical properties (tensile test, bend test), mercurous nitrate test, the lot shall be considered as conforming to that requirement of this specification.

## **12 RETESTS**

**12.1** If a test result of chemical analysis fail to satisfy the requirements for any of the constituent, two more tests for that constituent shall be done on the same sample in order to confirm that the analysis has been done properly. If both the test results satisfy the relevant requirements, the lot shall be considered as conforming to the specification, otherwise not.

**12.2** If any one of the test sample first selected fails to pass the tensile test, bend test and mercurous nitrate test, two further samples from the same lot shall be selected and tested for that test, one of which shall be from the coil/bundle from which original test sample was taken unless that coil/bundle has been withdrawn by the supplier.

**12.2.1** If both the additional samples pass that test, the lot represented by the test sample shall be deemed to comply with this standard. If either of these additional samples fail, the lot shall be rejected.

## **13 PACKING**

**13.1** The wires shall be coiled carefully and each length of wire shall be made up into a separate coil.

**13.2** The inner diameter of the coils, depending on the size of the wire, shall be subject to agreement between the purchaser and the supplier.

**13.3** In case of wires supplied in straight length, the length of each wire and mass of bundle shall be as agreed to between the purchaser and the supplier.

**13.4** The coils/bundles shall be suitably packed to avoid damage during transit.

## **14 MARKING**

**14.1** Suitable tags with marking made on them to show the size, grade, temper, lot number, date of manufacture, mass of the material, in addition to the name of the manufacturer and any such information required by the purchaser, shall be attached to each coil/bundle of the material.

### **14.2 Standard Marking**

The material may also be marked with the Standard Mark.

## **15 TEST CERTIFICATE**

The manufacturer/supplier shall provide test certificate for each consignment giving information, such as, lot number, corresponding chemical composition, tensile test, bend test and mercurous nitrate test results.

### **Standard Mark**

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

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